PERFORMANCE OF CEMENT GROUT INCORPORATING CERAMIC WASTE AS FILLER

NORHARYATI SALEH

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To my beloved late mother, father and families

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ABSTRACTS

The large bulk of ceramic waste nowadays leads to serious environmental problem since these materials are not reusable and recyclable. In second concern is related to the deterioration due to crack problem facing by concrete structure. The use of cement grout as one of repair materials for minor crack has been applied for many years. However, the natural sand as filler used in cement grout somehow needs another alternate material to substitute it due to depletion issue and has become expensive. Therefore, reuse of ceramic waste as substitute in natural sand has been proposed to minimise those problems. This research conducted focus on the performance of cement grout incorporating ceramic tile waste as filler. The experimental tests were performed to determine engineering properties consists of consistency, setting time, shrinkage behavior, water absorption, compressive and flexure strength. Different size particle of ceramic waste in range 150 µm to 850 µm were selected as partial replacement of sand as filler in cement grout. The result indicated the optimum of size particle that give better performance in their engineering properties was filler with size around 150 µm, without affecting significantly in design strength. The incorporating of ceramic waste has no negative effects on cement grout properties and thus can be used as alternate construction material in future. Besides, cement grout made from ceramic waste as filler may minimise the disposal problem as was mentioned earlier.

ABSTRAK

Dewasa ini, lambakan sisa seramik telah membawa masalah yang serius kepada alam sekitar kerana bahan ini tidak digunapakai dan dikitar semula. Manakala, perhatian juga diberikan kepada masalah berkaitan dengan kerosakan yang dihadapi oleh struktur konkrit iaitu keretakan. Penggunaan grout simen sebagai salah satu bahan pembaikpulihan bagi keretakan kecil sudah lama digunapakai sejak bertahun lamanya. Namun, pasir asli perlu diganti dengan bahan alternatif kerana faktor kekurangan dan harganya yang kian mahal. Oleh itu, mengunapakai sisa seramik sebagai bahan ganti bagi pasir asli telah dicadangkan untuk mengatasi masalah tersebut. Penyelidikan ini menerangkan tentang prestasi grout simen menggunakan sisa seramik sebagai pengisi. Beberapa siri ekperimen telah dijalankan bagi mengenalpasti sifat-sifat kejuruteraan iaitu konsistensi, masa ketetapan, sifat pengecutan, penyerapan air, daya mampatan dan juga lenturan. Sisa seramik dari saiz butiran yang berbeza iaitu 150 μm hingga 850 μm telah dipilih bagi mengantikan separuh daripada pasir asli sebagai pengisi dalam grout simen. Keputusan menunjukkan saiz butiran yang memberikan prestasi paling optimum dari segi sifat-sifat kejuruteraan adalah pengisi bersaiz lingkungan 150 μm, tanpa memberikan kesan ketara dalam kekuatan rekaan. Penggunaan sisa seramik tidak memberi sebarang impak negatif kepada sifat-sifat grout simen dan seterusnya boleh digunakan sebagai bahan pembinaan alternatif di masa hadapan. Selain itu, grout simen yang dibuat bersama sisa seramik sebagai pengisi juga mampu mengurangkan masalah pelupusan seperti yang dimaklumkan sebelum ini.